FIGURE 42A is a partial perspective view of a receptacle transport mechanism of the first embodiment of the luminometer;

FIGURE 42B is an end view of the receptacle transport mechanism of the first embodiment of the luminometer;

FIGURE 42C is a top view of the receptacle transport mechanism of the first embodiment of the luminometer;

FIGURE 43 is a break away perspective view of a second embodiment of the luminometer of the present invention;

FIGURE 44 is an exploded perspective view of a multi-tube unit door assembly for the luminometer of the second embodiment;

FIGURE 45 is an exploded perspective view of a shutter assembly for a photosensor aperture for the luminometer of the second embodiment;

FIGURE 45A is a perspective view of an aperture plate of the shutter assembly of the luminometer of the second embodiment;

FIGURE 46 is a perspective view of a receptacle vessel positioner assembly of the luminometer of the second embodiment, including a receptacle vessel positioner disposed within a receptacle vessel positioner frame;

FIGURE 47 is a perspective view of the receptacle vessel positioner;

FIGURE 48 is a side elevation of the receptacle vessel positioner assembly;

FIGURE 49 is a perspective view showing the receptacle vessel positioner of the receptacle vessel positioner assembly operatively engaging a multi-tube unit employed in a preferred mode of operation of the analyzer;

FIGURE 50 is a perspective view of a multi-tube unit transport mechanism of the luminometer of the second embodiment;

FIGURE 51 is a partial perspective view showing a multi-tube unit transport and drive screw of the multi-tube unit transport mechanism of the luminometer;

FIGURE 52 is a perspective view of a lower chassis of the analyzer of the present invention;

FIGURE 53 is a perspective view of a right-side drawer of the lower chassis;

FIGURE 54 is a perspective view of a left-side drawer of the lower chassis;

FIGURE 55 is a perspective view of a specimen tube tray employed in a preferred mode of operation of the analyzer of the present invention;

FIGURE 56 is a top plan view of the specimen tube tray;

FIGURE 57 is a partial cross-section of the specimen tube tray through line "57-57" in FIGURE 55;

FIGURE 58 is a perspective view of a multi-tube unit employed in a preferred mode of operation of the analyzer of the present invention;

FIGURE 59 is a side elevation of a contact-limiting pipette tiplet employed in a preferred mode of operation of the analyzer of the present invention and carried on the multi-tube unit shown in FIGURE 58; and

FIGURE 60 is an enlarged bottom view of a portion of the multi-tube unit, viewed in the direction of arrow "60" in FIGURE 58.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

ANALYZER OVERVIEW

An automated diagnostic analyzer according to the present invention is designated generally by reference number 50 in FIGURES 1 and 2. Analyzer 50 includes a housing 60 built over an internal frame structure 62, preferably made of steel. The analyzer 50 is preferably supported on caster wheels 64 structurally mounted to the frame structure 62 so as to make the analyzer movable.

The various stations involved in performing an automated assay and the assay specimens are housed within housing 60. In addition, the various solutions, reagents, and other materials used in performing the assays are preferably stored within the housing 60, as are the waste products generated when assays are performed with the analyzer 50.

Housing 60 includes a test receptacle loading opening 68, which is shown in FIGURE 1 to be disposed in a forwardly facing panel of the housing 60, but could as well be located in other panels of the housing 60. A pipette door 70 having a view window 72 and a carousel door 74 having a view window 76 are disposed above a generally horizontal work surface 66. A forwardly protruding arcuate panel 78 accommodates a specimen carousel, which will be described below. A flip-up arcuate specimen door 80 is pivotally attached to the housing so as to be vertically pivotal with respect to arcuate panel 78 so as to provide access to a forward portion of the specimen carousel behind the panel 78. Sensors indicate when the doors are closed, and the specimen door 80, the carousel door 74, and the pipette door 70 are locked during analyzer operation. The locking mechanism for each door preferably consists of a hook

attached to a DC rotary solenoid (rated for continuous duty) with a spring return. Preferred rotary solenoids are available from Lucas Control Systems, of Vandalia, Ohio, model numbers L-2670-034 and L-1094-034.

An extension portion 102, preferably made of a transparent or translucent material, extends above the top portion of housing 60 so as to provide vertical clearance for moving components within the housing 60.

The assays are performed primarily on a processing deck 200, which is the general location of the various assay stations of the analyzer 50 described below. For simplicity of the illustration, the processing deck 200 is shown in FIGURE 2 without any of the assay stations mounted thereon. The processing deck 200 comprises a datum plate 82 to which the various stations are directly or indirectly mounted. Datum plate 82 preferably comprises a machined aluminum plate. The processing deck 200, also known as the chemistry deck, separates the interior of the housing into the chemistry area, or upper chassis, above the datum plate 82 and the storage areas, or lower chassis 1100, located below the datum plate 82.

A number of fans and louvers are preferably provided in the upper chassis portion of the housing 60 to create air circulation throughout the upper chassis to avoid excessive temperatures in the upper chassis.

As the analyzer 50 of the present invention is computer controlled, the analyzer 50 includes a computer controller, schematically represented as box 1000 in FIGURE 2, which runs high-level analyzer-controlling software known as the "assay manager program". The assay manager program includes a scheduler routine which monitors and controls test specimen movement through the chemistry deck 200.

The computer controller 1000 which controls the analyzer 50 may include a stand-alone computer system including a CPU, keyboard, monitor, and may optionally include a printer device. A portable cart may also be provided for storing and supporting the various computer components. Alternately, the computer hardware for running the analyzer-controlling software may be integrally housed within the housing 60 of the analyzer 50.

Low level analyzer control, such as control of electric motors and heaters used throughout the analyzer 50 and monitoring of fluid levels within bulk fluid and waste fluid containers, is performed by an embedded controller, preferably comprising a Motorola 68332 microprocessor. Stepper motors used throughout the analyzer are also preferably controlled by